(54) [TITLE OF THE INVENTION] COMMUNICATION TERMINAL DEVICE

(57) [ABSTRACT]

[Problem to be Solved:] To provide a communication terminal device which enables to reduce the communication time and the cost at the time of retransmission, when the line is disconnected due to occurrence of an error in the communication using a both side communication function.

[Solution:] A transmission side device 1 transmits a communication number at the communication. A reception side device 2 stores a pair of a telephone number and the communication number of the transmission side device 1 in association with each other. The reception side device 2 stores a received image(s) in an information storage unit 22. When the image is completed on both sides, the device records the both sides of the image in a recording unit 24. At a communication error, the received image in the information storage unit 22 is kept as is. At the retransmission, the transmission side device 1 transmits the same communication number as that before the occurrence of the error. The reception side device 2 specifies the communication based on the telephone number and the communication number, and makes a response representing whether the image received in this communication remains in the information storage unit 22. The transmission side device 1 determines the transmission start page in response to the response, and transmits only a page(s) that is not completed on both sides.

[Scope of Claims]

[Claim 1] A communication terminal device which enables both side transmission, comprising:

communication means for performing communication with an other party; and

control means for transmitting both sides of an image using said communication means, wherein

said control means retransmits an image which is not completed on both sides, when retransmitting it due to occurrence of an error.

[Claim 2] The communication terminal device according to claim 1, wherein

said control means transmits information specifying communication when performing both side transmission, and designates information specifying the communication so as to retransmit an image when performing retransmission.

[Claim 3] The communication terminal device according to claim 2, wherein

said control means determines a transmission start page in response to a response from the other party.

[Claim 4] A communication terminal device which enables both side reception, comprising:

communication means for performing communication with an other party;

recording means for enabling to perform both side recording;

control means for receiving an image of both sides using

said communication means; and

storage means for storing the received image, wherein

said control means receives and keeps information specifying the communication at a time of both side reception, stores a transmitted image in said storage means and records an image completed on both sides in said recording means so as to delete it, maintains the image stored in said storage means even after a line is disconnected due to a communication error, specifies which communication is continuously made based on information specifying communication transmitted at a time of retransmission.

[Claim 5] The communication terminal device according to claim 4, wherein said control means deletes the image received in the communication from said storage means after a predetermined period of time has elapsed, after the line is disconnected due to a communication error.

[Claim 6] The communication terminal device according to claim 4 or 5, wherein

said control means deletes the image received in the communication from said storage means at a point of time that an amount of space in said storage means is equal to or lower than a predetermined value, after the line is disconnected due to a communication error.

[Claim 7] The communication terminal device according to any one of claims 4 to 6, wherein

said control means makes a negative acknowledge, when there is no image corresponding to information specifying the

communication in said storage means at a time of retransmission.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Pertains] The present invention relates to a communication terminal device having a both side communication function.

[0002]

[Prior Art] In recent years, a communication terminal device having a both side communication function has been developed. The both side communication function enables both side transmission in an alternate mode or a continuous mode in accordance with the ability on the reception side. The alternate mode is a mode for alternately transmitting an image on the front surface and an image on the back surface. The continuous mode is a mode for continuously transmitting the image on the back surface, after continuously transmitting the image on the front surface.

[0003] In general, the communication line may be disconnected due to occurrence of an error in the middle of communication. In this case, it is considered that information is recorded until a completely transmitted page on the reception side, in the one side communication. Thus, the information is retransmitted from the page wherein an error has occurred. However, when transmitting the information using a both side communication function, unless images recorded on the front and back surfaces of one sheet of paper are transmitted to the reception side, the communication for the one sheet of paper is not completed.

Thus, when the communication is performed using the both side communication function, only an image recorded, for example, on one side of a sheet of paper may be transmitted. In this case, it is considered that an image on the other side is not recorded on the reception side because there is no image of the other side, even the image on the one side is completely transmitted. When the communication is performed in a continuous mode, an image of the back surface is not transmitted, until the image on the front surface is completely transmitted. Thus, when the line is disconnected because an error has occurred while transmitting the image on the front surface, the both side recording of not even one sheet of paper can be completed on the reception side. Of course, a sheet of paper only one side of which is recorded is kept and held so as to be used for retransmission. However, it is not ensured that the retransmission is performed. It is desired that the recording unit be kept for the next reception. Therefore, it is not preferred that the sheet of paper only one side of which is recorded be stored in the unit. In consideration of this, the entire images are stored in a memory, etc. However, the so-far received images are often deleted, when a communication error has occurred.

[0004] Under such circumstances, when an error has occurred in the communication with the both side communication function, conventionally, the images of the entire pages are transmitted again, and the both side recording is securely performed on the reception side. However, the images are transmitted again from

the beginning, resulting in transmitting a lot of duplicate pages and resulting in an increase in the cost because of a long communication time. In addition, even when the images completed on both sides are recorded on the reception side, the images are transmitted all over again. Thus, the previous recording has come to nothing.

[0005]

[Problem to be Solved by the Invention] The present invention has been made in consideration of the above matter. An object of the invention is to provide a communication terminal device which can reduce a communication time and the cost at the time of retransmission, when a line is disconnected due to an error occurred in the communication with a both side communication function.

[0006]

[Means for Solving the Problem] According to the present invention, there is provided a communication terminal device which enables both side transmission comprising: communication means for performing communication with an other party; and control means for transmitting both sides of an image using the communication means, wherein the control means retransmits an image which is not completed on both sides, when retransmitting it due to occurrence of an error. There is no need to transmit those images completed on both sides, if the images are recorded and output on the other party. Thus, the images that are not completed on both sides are retransmitted, resulting in reducing the communication time and restraining the communication cost.

[0007] An error may occur in a plurality of communications on the other party. At this time, when retransmitting images that are not completed on both sides, it may not be understood to which communication the images correspond. In order to solve this, control means can be configured to transmit information specifying the communication at the time of both side transmission, and to designate information specifying communication at a time of retransmission so as to retransmit the image. The other party can determine to which communication the retransmission corresponds so as to complete the communication, based on the information specifying the communication. When performing the retransmission upon designation of information specifying the communication, information regarding the transmission start page may be included so as to be transmitted together.

[0008] At the time of retransmission, the present invention may be configured to presume how the image transmitted in the previous communication is at the other party based on a reply from the other party, and to determine the transmission start page based on a reply from the other party.

[0009] According to the present invention, there is provided a communication terminal device which enables both side reception, comprising: communication means for performing communication with an other party; recording means for enabling to perform both side recording; control means for receiving an image of both sides using the communication means; and storage means for storing the received image, and wherein the control means

receives and keeps information specifying the communication at a time of both side reception, stores a transmitted image in the storage means and records an image completed on both sides in the recording means so as to delete it, maintains the image stored in the storage means even after a line is disconnected due to a communication error, specifies which communication is continuously made based on information specifying communication transmitted at a time of retransmission. Accordingly, when receiving the retransmission after the line is disconnected due to a communication error, there is no need for the other party of the transmitter to retransmit those images whose both sides are completely transmitted, as a result that the images completed on both sides are recorded. The other party retransmits those images that are not completed on both sides, thus reducing the communication time and restraining the communication cost as well. The images are managed based on information specifying the communication, thus enabling to easily determine which communication is continuously made even at the time of retransmission.

[0010] The image(s) only one side of which has been received is stored in the storage means at the occurrence of a communication error. If the retransmission is not received, the image remains in the storage means as is, thus wasting the memory capacity. In order to avoid this, the control means can be configured to delete the image received in the communication from the storage means after a predetermined period of time has elapsed, and to delete the image received in the communication from the storage

means at a point of time when the space of the storage means is equal to or lower than a predetermined value, after the line is disconnected due to, for example, a communication error. In order to inform the transmission side of whether the transmitted image has been deleted on the reception side, the control means can control to send a negative acknowledge, when there is no such an image corresponding to information specifying the communication at the time of retransmission in the storage means. The other party of the transmission side can determine the transmission start page in accordance with whether this negative acknowledge has been sent. When information regarding the transmission start page has been transmitted from the other party of the transmission side, it is possible to respond to whether the transmission start page is satisfactory. Of course, in addition to the negative acknowledge, it is possible to inform the transmission side of the page to be received.

[0011]

[DESCRIPTION OF THE PREFERRED EMBODIMENT] Fig. 1 is a block diagram showing an example of a system including an embodiment of a communication terminal device of the present invention. In the illustration, "1" denotes a transmission side device, "2" denotes a reception side device, "3" denotes a line, "11" and "21" denote a main control unit, "12" and "22" denote an information storage unit, "13" and "23" denote a communication unit, "14" denotes a reading unit, and "24" denotes a recording unit. The transmission side device 1 has at least a both side transmission function, and can transmit both sides of an image

to the reception side device 2 through the line 3. The reception side device 2 has at least a both side reception function, and can receive both sides of an image from the transmission side device 1 through the line 3. At the both side communication, the transmission side device 1 transmits communication specification information, for example, a communication number. The reception side device 2 receives and registers both of information specifying the other party including the telephone number of the transmission side device 1 transmitted from the transmission side device 1 and also information of the communication specification information transmitted from the transmission side device 1, in case of communication error. When the line 3 is disconnected due to a communication error, the transmission side device 1 transmits communication specification information. Upon reception of this information, the reception side device 2 specifies disconnected communication. Then, it responds to the transmission side device 1 whether an image received before the disconnection remains. The transmission side device 1 determines an image page to be retransmitted in response to a response from this reception side device 2, and transmits an image which is not completed on both sides to the reception side device 2.

[0012] To realize such a function, the transmission side device 1 has at least the main control unit 11, the information storage unit 12 and the communication unit 13, and further the reading unit 14 in this example. Of course, in addition to the above, the device may have various configurations including a recording

unit, an operation unit and various interfaces and the like. The main control unit 11 controls the entire operations of the transmission side device 1. In this case, the unit controls the operations for realizing at least the both side transmission function. For example, after acquiring an image to be transmitted externally or from, for example, the reading unit 14 and storing the image in information storage unit 12, the communication unit 13 calls the reception side device 2 so as to perform communications in accordance with a communication procedure for the both side transmission, upon connection to the line 3. Normally, in this procedure, the main control unit transmits a telephone number of the transmission side device 1, but this unit additionally transmits information specifying this communication. The unit receives the ability for the both side communication from the reception side device 2, and selects either a continuous mode or alternate mode. Then, the unit sequentially transmits images stored in the information storage unit 12 in accordance with the selected mode.

[0013] When the line 3 is disconnected due to a communication error, the main control unit 11 can automatically retransmit the information in accordance with the setting. At the retransmission, the unit transmits the communication specification information transmitted to the reception side device 2 in the communication before occurrence of an error. At this time, the main control unit may transmit information about a page to be initially retransmitted. The reception side device 2 replies in response to this. In accordance with this

reply, a transmission start page is determined. For example, if an error occurs during the transmission of the front surface in the continuous mode, the main control unit begins to transmit an image of a page wherein an error has occurred, when a positive acknowledge is returned from the reception side device 2. When a negative acknowledge is returned, the main control unit tries again to transmit from the initial page. If an error occurs during the transmission of the back surface in the continuous mode, the main control unit begins to transmit an image of a page wherein an error has occurred, when a positive acknowledge is returned from the reception side device 2. When a negative acknowledge is returned, the main control unit tries again to transmit an image of the front surface from the corresponding front surface page, and then transmits an image of the corresponding back surface. When the reception side device 2 specifies a retransmission page, the main control unit needs to simply transmit the information in accordance with the retransmission page. Alternatively, at the retransmission, a mode for retransmitting the information from the initial page may be provided, and the modes can be switched from one to the other in accordance with the setting.

[0014] The information storage unit 12 includes a memory unit, such as a semiconductor memory, a disk unit, or the like, and keeps an image to be transmitted. Of course, when images read by the reading unit 14 are successively transmitted in the rapid transmission, no image may be stored in the information storage unit 12. The information storage unit 12 can store various

information in the transmission side device 1, in addition to the images.

[0015] The communication unit 13 performs communications with the other party, such as the reception side device 2, through the line 3. Particularly, the unit has an automatic dial function, and thus can call the reception side device 2 in response to an instruction from the main control unit 11 at the time of retransmission.

[0016] The reading unit 14 can read the image to be transmitted. Even when the both side transmission is to be performed, the draft may have only one side. This reading unit 14 may have or may not have a both side reading mechanism. Further, if it is configured that the image to be transmitted is externally given, this reading unit 14 may not be necessary.

[0017] The reception side device 2 has at least the main control unit 21, the information storage unit 22, the communication unit 23 and the recording unit 24. Of course, in addition to the above, the device may have various configurations including the reading unit, the operation unit, various interfaces, and the like. The main control unit 21 controls the entire operations of the reception side device 2. In this case, the unit controls the operations for realizing at least the both side reception function. For example, upon detection of a call by the communication unit 23 through the line 3, the line 3 is connected so as to begin a communication procedure. In this procedure, the main control unit transmits the ability for the both side reception of the reception side device 2 to the transmission

side device 1, and receives information specifying all the communication mode, the telephone number of the transmission side device 1 and this communication from the transmission side device 1. At this time, the unit determines whether a set of the information specifying the telephone number and the communication have been transmitted beforehand. If the set of information have not been transmitted, the unit determines that this is new communication. Then, the unit sends a positive acknowledge, thereafter receiving the both sides of images. The received images of the both sides are once stored in the information storage unit 22. If the received images of the front surface and back surface are completed on both sides, the images are both stored and recorded in the recording unit 24, and the recorded images are deleted from the information storage unit 22.

[0018] When the line 3 is disconnected due to occurrence of a communication error, the main control unit 21 keeps the received unrecorded image(s) in the information storage unit 22 as they are, and keeps also the set of information specifying the telephone number and the communication. The received image kept in the information storage unit 22 may be deleted, for example, when a predetermined period has elapsed, or when the amount of space in the information storage unit 22 is equal to or lower than a predetermined amount of space.

[0019] Further, when the information specifying the received telephone number called from the transmission side device 1 and specifying the communication is one that has been transmitted

and kept beforehand, the unit determines that the communication is the recommunication performed after the communication error. The main control unit sends, to the transmission side device 1, a reply representing whether an image(s) of images transmitted before the occurrence of error other than the recorded image is stored in the information storage unit 22. Alternatively, the main control unit may transmit back a page to be retransmitted to the transmission side device 1. The transmission side device 1 determines a page to be retransmitted based on the above reply. Thus, the main control unit simply needs to receive the images transmitted from the transmission side device 1.

[0020] The information storage unit 22 includes a memory unit, such as a semiconductor memory, a disk unit, and the like. The unit temporarily keeps the received image, and also keeps the set of information specifying the telephone number and information specifying the communication that are received in the reception procedure. Of course, when the received image is recorded as is, no image may be stored in the information storage unit 22. The information storage unit 22 can store various information in the reception side device 2, in addition to the received image, the set of information specifying the telephone number and the information specifying the communication.

[0021] The communication unit 23 performs the communication with the other party, such as the transmission side device 1 through the line 3.

[0022] The configurations of the transmission side device 1

and the reception side device 2 have been described above simply by way of example. For example, both of the transmission side device 1 and the reception side device 2 may have a both side transmission function and a both side reception function.

[0023] Descriptions will now be made to operations in one embodiment of the communication terminal device of the present invention, both in the cases of the transmission side device 1 and the reception side device 2. Fig. 2 is a flowchart showing an example of transmission operations in the transmission side device. In S31, the reading unit 14 reads the image of the draft to be transmitted. In S32, the read image is stored in the information storage unit 12. If the draft has two sides, both of the front and back surfaces are read. Of course, the draft may have only one side.

[0024] After the image of one or more pages is read, or the reading is completed, the communication unit 13 calls a specified telephone number in S33. Upon connection of the reception side device 2 and the line, the reception side device 2 transmits a DIS, and the transmission side device receives this DIS. The DIS includes information regarding the ability of the reception side device 2 and also information regarding the ability for the both side reception. In this case, the reception side device 2 has the ability for the both side reception in the continuous mode, thus performing both side transmission in the continuous mode.

[0025] Upon reception of the DIS, the device transmits information specifying this communication, using an NSS as a

function setting signal of its mode, in S35. In this case, this information is a communication number. If this communication number is transmittable using another standard signal (e.g. a DCS, SUB or the like), the information may be transmitted when this standard signal is transmitted. At the same time, the telephone number of the transmission side device 1 is transmitted using a TSI. The reception side device 2 can specify this communication using the communication number and the telephone number. Further, in S36, the function at the communication is set using the DCS. In this DCS, the mode at the both side communication is set. In this case, the continuous mode is set.

[0026] Upon transmission of any of the signals, the reception side device 2 returns a CFR. In S37, the transmission side device receives this signal, thus enabling to transmit an image. In S38, a variable P representing a page to be transmitted is initialized to 1. In S39, the image of the page to be transmitted and stored in the information storage unit 12 is read and transmitted from the communication unit 13. This information is referred to as PIX, a first parameter P represents a page, and a second parameter represents either the front surface or back surface of the page. Upon complete transmission of the image, in S40, the transmission side device transmits an MPS. At the time of both side transmission, information representing the page number of the transmitted page and representing either the front surface or back surface is added to the MPS.

[0027] Upon transmission of the MPS, if the reception side device 2 normally receives the image, an MCF is returned. In S41, the

transmission side device determines whether the MCF has been received. If the MCF has been received, the image is normally transmitted. In this case, the transmission side device determines whether the image of the front surface has been completely transmitted in S42. If the image of the front surface still remains, 2 is added to the variable P representing the page in S43, and the flow returns to S39, wherein the next image of the front surface is transmitted. After repeating the procedures, once the image of the front surface is completely transmitted, the flow proceeds to a procedure for transmitting the image of the back surface after S44.

[0028] When transmitting the image of the back surface, in S44, the variable P representing the page to be transmitted is initialized to 2. After it is confirmed that the image of the P page is stored in the information storage unit 12 in S45, the image (PIX) of the P page is transmitted to the reception side device 2 in S46. Further, in S47, the MPS is transmitted. At this time, the page number to be transmitted is specified, and it is also specified that the image is the back surface.

[0029] If the reception side device 2 normally receives the image, an MCF is returned. Thus, in S48, it is determined whether the MCF has been received. If the MCF has been received, it is indicated that the image has normally been transmitted. As a result, the transmitted image of the back surface and the image of the front surface corresponding to the back surface have both completely been transmitted. Thus, the reception side device 2 can record the images of the both sides. Because the images

are not necessarily transmitted again, the images of the front surface and the back surface are deleted from the information storage unit 12 in S49.

[0030] In S50, it is determined whether all the images of the back surface have completely been transmitted. If an untransmitted image remains, 2 is added to the variable P representing the page to be transmitted in S51, and the flow returns to S45 so as to transmit the next image of the back surface. After repeating the procedures for transmitting the image(s) of the back surface, once the image(s) of the back surface is completely transmitted, the images which have completely been transmitted are deleted from the information storage unit 12 in S52, thereby completing the transmission process.

[0031] When the MCF cannot be received from the reception side device 2 in S41 or S48, this communication ends with an error due to timeout. In this case, after the line 3 is once disconnected, the next retransmission process is performed.

[0032] Fig. 3 is a flowchart showing an example of a retransmission operation in the transmission side device. As described above, after the line is disconnected due to a communication error, the retransmission process shown in Fig. 3 is performed. After the disconnection of the line, after a predetermined period of time (e.g. one minute or more) is waited in S61, the transmission side device calls the reception side device 2 again in S62. If the line is connected, a DIS transmitted from the reception side device 2 is received in S63.

[0033] In S64, the transmission side device refers the setting

of the operation at the retransmission, and determines whether the setting is provided for retransmitting the entire pages or the setting is provided for transmitting only a necessary page(s). In the setting of retransmitting the entire pages, in S65, the device transmits all images stored in the information storage unit 12, including those pages only one side of which has completely been transmitted but excluding those images both sides of which have been transmitted.

[0034] In the setting of transmitting only a necessary page, in S66, the device sets a variable RetxP representing the initial page of retransmission, to the value of the variable P. That is, the device sets to retransmit the image from the page in which the communication error has occurred. Like S35 and S36 of Fig. 2, in S67, the device transmits an NSS, a TSI and a DCS. The NSS at this time includes the communication number transmitted before the occurrence of the error, and further includes a retransmission start page RetxP in this example.

[0035] After transmission of these signals, the device examines the signal returned from the reception side device 2 in S68. The reception side device 2 returns a CFR, if an image before the communication error remains at the time of retransmission, as will be described later. In addition, the device returns an FNV, if no image remains. This determination is made in S68. When the reception side device 2 returns a CFR, the transmission side device simply needs to transmit an image of a subsequent page(s). In S69, after the retransmission start page RetxP is set as a transmission page P, the device determines whether the

transmission start page RetxP (or the transmission page P) is an odd number or an even number in S70. If the page is an odd number, the flow returns to S39 of Fig. 2 for continuing transmitting the image of the front surface. If the transmission start page RetxP is an even number, the flow returns to S45 of Fig. 2 for continuing transmitting the image of the back surface. As a result, the image transmitted before the communication error is not necessarily transmitted, and the communication time can be reduced, thus reducing the communication cost as well.

[0036] When the image transmitted before the communication error does not remain in the reception side device 2, and the FNV is returned, the page only one side of which is transmitted needs to be retransmitted, even if the transmission is completed. In S71, the device determines whether the transmission page P is an odd number or an even number. If the transmission page P is an odd number, it indicates that the image of the front surface is being transmitted at the occurrence of a communication error. In the continuous mode, the image of the back surface is not transmitted during the transmission of the front surface. Thus, the images of the front surface and the back surface are not completed on both sides. It can therefore be considered that only the image of the front surface has been transmitted. However, only the transmitted image does not remain in the reception side device 2. It is necessary to transmit the entire images again. In S72, the transmission start page RetxP is set to 1, and the flow returns to S67 so as to transmit an NSS, a TSI and a DCS again. In response to these signals transmitted

for the second time, the reception side device 2 returns a CFR. In S69, the transmission page P is set to the transmission start page RetxP (=1). Then, the flow returns from S70 to S39 so as to transmit the information from the first page again.

[0037] When determined that the transmission page P is an even number in S71, it indicates that the image of the back surface is being transmitted at the occurrence of the communication error. In the continuous mode, because the image of the back surface is transmitted after transmitting the entire image of the front surface, the image of the front surface has already been transmitted. However, the reception side device 2 transmits an FNV for informing that the transmitted image does not remain. Thus, it is necessary to transmit the image of the front surface corresponding to the image of the back surface that is to be transmitted from this time on. The image of the front surface corresponding to the transmission start page RetxP (back surface) is a "(RetxP-1)" page. Thus, in S73, the transmission start page RetxP is set as a "(RetxP-1)", and the flow returns to S67 so as to transmit an NSS, a TSI and a DCS again. In response to these signals transmitted for the second time, the reception side device 2 returns a CFR. In S69, the transmission page P is set as the transmission start page RetxP (=P-1). Because the transmission start page RetxP is an odd number, the flow returns from S70 to S39, wherein the image of the front surface is continually transmitted from the front surface page corresponding to the back surface page in which the communication error has occurred.

[0038] When the communication error has occurred in the back surface page, the transmitted image of the back surface page is completed on both sides of the front surface and the back surface, and thus will be deleted from the information storage unit 12. Therefore, after complete transmission of the image of the front surface, when transmitting the image of the back surface, the deleted page is skipped in the procedures from S45 to S51, and transmission begins from the page in which the communication error has occurred.

[0039] Accordingly, even when the transmitted image that is not completed on both sides is deleted in the reception side device 2, the retransmission can normally be performed. In this case, because the image both sides of which have been transmitted is not transmitted, the communication time can be reduced, thus reducing the communication cost as well.

[0040] Fig. 4 is a flowchart showing an example of a reception operation in the reception side device. Upon call from the line 3 to the communication unit 23, the reception side device 2 begins a communication procedure. In S81, the device transmits a DIS to the transmission side device 1 so as to inform the transmission side device of the reception ability of the reception side device 2. This information includes the ability for the both side reception. In this case, the both side reception is possible in the continuous mode. For the initial setting, the flag for accepting retransmission is set OFF in S82.

[0041] In S83, the device receives the NSS, TSI, DCS transmitted from the transmission side device 1. The device receives the

communication number specifying this communication, from the NSS. The TSI includes the telephone number of the transmission side device 1. Further, the DCS includes information about the setting of the function at the time of communication, and includes also setting information representing whether the both side communication is performed in the continuous mode or in the alternate mode.

[0042] In S84, the device determines the mode in the both side communication based on the DCS. The device performs a reception process in the alternate mode in S85, in the case of the alternate mode, and records the information on the both sides in the recording unit 24 so as to complete the reception process.

[0043] In the case of the continuous mode, in S86, the device determines whether a pair of the telephone number of the transmission side device 1 which is transmitted with the TSI and the communication number transmitted with the NSS is stored. If the pair of the telephone number and the communication number is not stored, it is the new communication. In S87, the received telephone number and the communication number are stored, for example, in the information storage unit 22 in association with each other. In S90, the CFR is transmitted. In S91, the device receives the image transmitted from the transmission side device 1, and stores the received image in the information storage unit 22. At this time, the device updates the reception time in S92. This reception time is used for determining when to delete the image which is kept as is in the information storage unit 22 due to the communication error.

[0044] After reception of the image, the device determines a signal that is transmitted from the transmission side device 1. If the signal is an MPS, the image of the subsequent page is continuously transmitted. Thus, after the MCF is transmitted in S94, the flow returns to S91 so as to receive the image of the subsequent page. If an EOP is transmitted, it indicates that there is no image of the subsequent page. Thus, in S95, the images of the front surface and the back surface completed on both sides are recorded in the recording unit 24. In S96, the images recorded in S95 are deleted from the information storage unit 22 so as to complete the reception process.

[0045] After reception of the image, if nothing is transmitted from the transmission side device 1, the communication is interrupted due to the communication error in S97. Also in this case, the images of both of the front surface and the back surface completed on both sides are recorded in the recording unit 24 in S95. In S96, the images recorded in S95 are deleted from the information storage unit 22 so as to complete the reception process. However, in the case of the communication error, the images may not be completed on both sides. In this case, those images that are not completed on both sides are not deleted from the information storage unit 22, and are kept as they are. The communication number and the telephone number included in the NSS and TSI received in S83 are kept in the information storage unit 22 together with those images in association with each other. Those images kept in the information storage unit 22 may be deleted in accordance with a deletion process as will be described later.

However, the pair of the communication number and the telephone number is kept as it is until completion of the communication.

[0046] After the communication is interrupted due to disconnection of the line, resulting from the occurrence of the communication error, the transmission side device 1 retransmits information. Also in this case, the process when a call is received in the reception side device 2 is performed as the same as a normal process. That is, after the DIS is transmitted in S81, a flag is set OFF in S82, and the NSS, the TSI and the DCS are received in S83. If the DCS represents the continuous mode, the flow proceeds from S84 to S85.

[0047] In S85, the device determines whether the pair of the telephone number and the communication number is stored. At this time, the transmission side device 1 transmits the communication number included in the NSS, at the time of retransmission. In this case, the communication number is one that has been transmitted to the reception side device 2 in the communication, resulting in the communication error. Thus, upon reception of retransmitted information from the transmission side device 1, the pair of the transmitted telephone number and the communication number has already been received and stored. The flow proceeds to S88 so as to perform the process to be performed upon reception of retransmitted information. In S88, the device determines whether the flag is ON or OFF. Right after reception of the retransmitted information, the flag is OFF, thus proceeding to S89.

[0048] In S89, the device determines whether the received images

corresponding to the communication specified by the pair of the telephone number and the communication number remain in the information storage unit 22. If the received images remain in the information storage unit 22, there is no need to receive the retransmission of the images. In this case, in S90, the device transmits a CFR, and instructs the transmission side device 1 to transmit images from the subsequent page. As a result, the transmission side device 1 transmits the images from the subsequent page, thus sequentially receiving the images from S91 to S94. The processes for receiving the images and subsequent processes are the same as those described above.

[0049] In S89, when the device determines that the received images corresponding to the communication specified by the pair of the telephone number and the communication number do not remain in the information storage unit 22, the device transmits an FNV to the transmission side device 1 in S98. This FNV is to instruct the device to retransmit the image(s) that is not completed on both sides of the front surface and the back surface, of those transmitted images. That is, the device transmits a negative acknowledge. In response to this negative acknowledge, the transmission side device 1 updates the transmission start page so as to retransmit the transmitted image, as described in Fig. 3, and transmits the NSS, the TSI and the DCS again. The flow returns to S83 so as to receive these transmitted signals. Before or after the transmission of the FNV, the flag is set ON in S99. Note that either the procedure of S98 or the procedure of S99 may be performed first.

[0050] Upon reception of the retransmission from the transmission side device 1, when the NSS, the TSI and the DCS are received, the pair of the telephone number and the communication number are stored. Thus, the flow proceeds to S88. Because the flag is ON, the CFR is transmitted in S90. Accordingly, when the transmission side device 1 sets the transmission start page again, the device transmits a CFR instead of transmitting the FNV in accordance with the flag. The transmission side device 1 sequentially transmits those images from the transmission start page which has been set again, so the images are sequentially received from S91 to S94. The processes for receiving the images and the subsequent processes are the same as those described above.

[0051] Accordingly, after the communication is interrupted due to a communication error, when the transmission side device 1 retransmits information, the device 2 sends a response signal representing whether the received images that are not completed on both sides remain in the reception side device 2. As a result, the transmission side device 1 can determine which page to be transmitted therefrom. Thus, if the transmitted images remain in the reception side device 2, there is no need to transmit those images, thus reducing the communication time and communication cost.

[0052] In the example of the reception operation shown in Fig. 4, when receiving the retransmission, a determination is made only as to whether the images received in the previous communication remain. However, when the information about the

transmission start page is transmitted from the transmission side device 1, another determination can be made as to whether this transmission start page is satisfactory. At this time, the device may be configured to transmit the page to be initially received, to the transmission side device 1.

[0053] Fig. 5 is a flowchart showing an example of an image deletion operation in the reception side device. As described above, in the reception side device 2, when the communication error has occurred, the images which are not yet completed on both sides of the front surface and the back surface remain in the information storage unit 22 as they are. However, the images may not possibly be retransmitted from the transmission side device 1. In such a case, the images not completed on both sides stay in the information storage unit 22 for a long time, thus possibly interfering with any other process. Therefore, in this case, such images are to be deleted after a predetermined period of time has elapsed.

[0054] That is, in S101, the reception time is subtracted from the present time, thereby obtaining the "time elapsed". The reception time is updated in S92 of Fig. 4, and the "time elapsed" can be obtained based on the latest reception time. This "time elapsed" is compared with a predetermined period of time. If the "time elapsed" is within the predetermined period of time, the images stored in the information storage unit 12 are kept as they are. On the other hand, if the "time elapsed" is equal to or greater than the predetermined period of time, the received images stored in the information storage unit 12 are deleted,

resulting in increasing the amount of space in the information storage unit 12. Even the images are deleted, management data including the pair of the telephone number and the communication number is stored as is. Accordingly, the pair of the telephone number and the communication number are stored. Thus, when the retransmission is received from the transmission side device 1, it can be acknowledged that the retransmission is received, even if the images are not stored. In addition, the presence of the storage of the images can be informed to the transmission side device 1.

[0055] In this embodiment, the received images stored in the information storage unit 12 are deleted based on the predetermined time elapsed. In addition to this, the received images may be deleted, when the amount of space in the information storage unit 12 is equal to or lower than a predetermined value. Of course, conditions for deleting the received images may arbitrarily be set. For example, both of the above conditions or further conditions may be set.

[0056] Fig. 6 is an explanatory diagram showing a concrete example of an operation in an example of a system including one embodiment of the communication terminal device of the present invention. Descriptions will now be made to a concrete example of a case wherein both side transmission of the totally ten pages of images in the continuous mode is performed between the transmission side device 1 and the reception side device 2 which perform the above-described operations. Both side transmission of the ten pages of images in the continuous mode is performed

in the transmission order of pages 1, 3, 5, 7, 9, 2, 4, 6, 8 and 10, as shown in Fig. 6A.

[0057] Fig. 6B shows an example wherein the images of pages 1, 3 and 5 are completely transmitted, and an error has occurred when the image of page 7 is being transmitted. In this case, the reception side device 2 normally receives the images of pages 1, 3 and 5. The images of these pages are stored and kept in the information storage unit 22. The telephone number and the communication number of the transmission side device 1 at this time are stored also. When retransmitting the images from the transmission side device 1 in the state wherein the images of these pages remain in the information storage unit 22, the process of the reception side device 2 proceeds from S89 to S90 in Fig. 4. Then, a positive acknowledge (CFR) is transmitted from the reception side device 2 to the transmission side device 1. Thus, the transmission side device 1 starts again transmitting the images continuously from page 7. As a result, the images of pages 1, 3 and 5 are not retransmitted, thus reducing the communication time and communication cost.

[0058] When the retransmission from the transmission side device 1 is delayed, or when the received images are deleted for the reason that there is no space in the information storage unit 22 of the reception side device 2, the reception side device 2 transmits a negative acknowledge (FNV) in S98 of Fig. 4. In the transmission side device 1, the flow proceeds from S68 to S71 of Fig. 3. In S72, the transmission start page is set to "1", because the transmission page is page "7". Thus, the images

are retransmitted from page "1".

[0059] Fig. 6C shows an example wherein an error has occurred when the image of page 8 is being transmitted, upon complete transmission/reception of the image of the front surface, and upon complete transmission/reception of the images of the back surface of pages 2, 4 and 6. In this case, in the reception side device 2, the images of pages 1, 2, 3, 4, 5 and 6 are completed on both sides of the front and back surfaces so as to be recorded in the recording unit 24 in the form of both sides and to be deleted from the information storage unit 22. The images of pages 7 and 9 that are not completed on both sides of the front and back surfaces remain in the information storage unit 22. The telephone number and the communication number of the transmission device 1 at this time are stored as well. When retransmission is performed from the transmission side device 1 in the state wherein the images of these pages remain in the information storage unit 22, the process of the reception side device 2 proceeds from S89 to S90 in Fig. 4, and the reception side device 2 transmits a positive acknowledge (CFR) to the transmission side device 1. Thus, the transmission side device 1 begins to transmit again the images continuously from page 8. As a result of this, at the retransmission, only the images of pages 8 and 10 need to be transmitted/received, thus reducing the communication time and communication cost remarkably.

[0060] When the retransmission from the transmission side device 1 is delayed, or when the received images are deleted for the reason that there is no space in the information storage

unit 22 of the reception side device 2, the reception side device 2 transmits a negative acknowledge (FNV) in S98 of Fig. 4. In the transmission side device 1, the flow proceeds from S68 to S71 of Fig. 3. In S73, the transmission start page is set to page (8-1=7), because the transmission page is page 8. Thus, the images are retransmitted from the front surface of page 7. In this case, the images of the front surface of pages 7 and 9 are transmitted. After that, the images of the back surface of pages 2, 4 and 6 are completed on both sides so as to be deleted, while the images of pages 8 and 10 that are not completed on both sides are transmitted. Also in this case, the communication time at the time of retransmission can be reduced, and the communication cost can be reduced as well.

[0061] In the above descriptions of the operations, the reception side device 2 returns the CFR when the received images are not deleted, and returns the FNV when the received images are deleted. However, the present invention is not limited to this. When the transmission start page is set on the assumption that the entire pages are transmitted from the transmission side device 1, the reception side device 2 may make an opposite response based on the setting.

[0062]

[Effect of the Invention] As obvious from the above descriptions, according to the present invention, when retransmission is performed due to a communication error, only images that are not completed on both sides of the front surface and back surface can be transmitted, upon specification of which communication

retransmission is performed for based on information specifying the communication. This results in an effect of reducing the communication time and also the communication cost. The reception side also keeps the so-far received images even when a communication error has occurred. The reception side makes a response representing whether the received images are kept based on the information specifying the communication. Thus, the transmission side can determine the transmission page based on the state of the reception side, thus enabling to normally transmit the information.

[Brief Description of the Drawings]

Fig. 1 is a block diagram showing an example of a system including one embodiment of a communication terminal device of the present invention.

Fig. 2 is a flowchart showing an example of a transmission operation in a transmission side device.

Fig. 3 is a flowchart showing an example of a retransmission operation in the transmission side device.

Fig. 4 is a flowchart showing an example of a reception operation in a reception side device.

Fig. 5 is a flowchart showing an example of an image deletion operation in the reception side device.

Fig. 6 is an explanatory diagram showing a specific example of an operation in an example of a system including one embodiment of the communication terminal device of the present invention.

[Explanations of Numerals]

1 Transmission Side Device

2 Reception Side Device

3 Line

11, 21 Main Control unit

12, 22 Information Storage Unit

13, 23 Communication Unit

14 Reading Unit

24 Recording Unit

FIG. 1

1. TRANSMISSION SIDE DEVICE

2. RECEPTION SIDE DEVICE

3. LINE

11. MAIN CONTROL UNIT

12. INFORMATION STORAGE UNIT

13. COMMUNICATION UNIT

14. READING UNIT

21. MAIN CONTROL UNIT

22. INFORMATION STORAGE UNIT

23. COMMUNICATION UNIT

24. RECORDING UNIT

FIG. 2

TRANSMIT

S31. READ DRAFT IMAGE

S32. STORE IN INFORMATION STORAGE UNIT

S33. CALL

S34. RECEIVE DIS (CONTINUOUS MODE)

S35. NSS (COMMUNICATION NUMBER)
TSI (TELEPHONE NUMBER)

S36. DCS (CONTINUOUS MODE)

S37. RECEIVE CFR

S39. TRANSMIT PIX (P, FRONT)

S40. MPS (P, FRONT)

S41. RECEIVE MCF

S42. FRONT COMPLETED

S45. IMAGE OF PAGE "P"

S46. TRANSMIT PIX (P, BACK)

S47. MPS (P, BACK)

S48. RECEIVE MCF

S49. DELETE IMAGE OF FRONT AND BACK

S50. ALL BACK SURFACES COMPLETED

S52. DELETE ALL IMAGES

END

再送へ FOR RETRANSMISSION

FIG. 3

RETRANSMIT

S61. WAIT FOR PREDETERMINED PERIOD OF TIME

S62. CALL

S63. RECEIVE DIS

S64. SETTING FOR RETRANSMITTING ALL PAGES?

S65. RETRANSMIT PAGES INCLUDING THOSE ONLY ONE SIDE OF WHICH HAS COMPLETELY BEEN TRANSMITTED

END

S67. NSS (COMMUNICATION NUMBER, RetxP)

TSI (TELEPHONE NUMBER)

DCS (CONTINUOUS MODE)

S68. RESPONSE

奇数 ODD NUMBER

偶数 EVEN NUMBER

S71. IS P ODD NUMBER?

FIG. 4

RECEIVE

S81. TRANSMIT DIS (CONTINUOUS MODE)

S82. FLAG OFF

S83. RECEIVE NSS, TSI, DCS

S84. CONTINUOUS MODE

S85. RECEIVE IN ALTERNATE MODE AND RECORD BOTH SIDES

END

S86. PAIR OF TELEPHONE NUMBER AND COMMUNICATION NUMBER STORED?

S87. STORE PAIR OF TELEPHONE NUMBER AND COMMUNICATION NUMBER

S88. FLAG ON?

S89. IMAGE OF TELEPHONE NUMBER AND COMMUNICATION NUMBER REMAIN?

S90. TRANSMIT CFR

S91. RECEIVE PIX

S92. UPDATE RECEPTION TIME

反応なし NO RESPONSE

S94. TRANSMIT MCF

S95. RECORD BOTH SIDES OF THE IMAGES COMPLETED ON BOTH SIDES

S96. DELETE RECORDED IMAGE

END

S97. ERROR INTERRUPTION

FIG. 5

DELETE IMAGE

S101. PRESENT TIME - RECEPTION TIME

所定時間未満 LESS THAN PREDETERMINED PERIOD OF TIME

所定時間以上 EQUAL TO OR GREATER THAN PREDETERMINED PERIOD OF

TIME

受信画像消去（電話番号、通信番号は保存）DELETE RECEIVED IMAGE (STORE TELEPHONE NUMBER AND COMMUNICATION NUMBER)

END

FIG. 6B

ERROR

画像保存　　STORE IMAGE

画像削除　　DELETE IMAGE

FIG. 6C

ERROR

画像保存　　STORE IMAGE

画像削除　　DELETE IMAGE

両面記録　　RECORD BOTH SIDES